

**EXPANDED SITE INSPECTION REPORT
WILCOX REFINERY
CREEK COUNTY, OKLAHOMA
EPA CERCLIS ID # OK0001010917**

September 30th, 2011

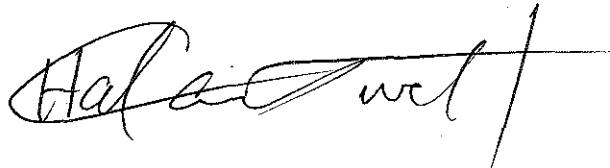
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Date: September 30th, 2011

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Site: Wilcox Refinery, Creek County

EPA ID #: OK0001010917

1. INTRODUCTION

The State of Oklahoma Department of Environmental Quality (DEQ) under the Multi-Site Cooperative Agreement (CA# V-00645-01) with the U.S. Environmental Protection Agency (EPA), as authorized by CERCLA and as amended by SARA, conducted a Expanded site inspection (ESI) of the Wilcox Refinery Site (CERCLIS # OK0001010917), located in Creek County, Oklahoma (Reference 1).

The purpose of this investigation was to collect information concerning conditions at the site sufficient to assess the threat posed to human health and the environment, to determine the need for additional investigation under CERCLA/SARA, and, if appropriate, support site evaluation using the Hazard Ranking System (HRS) for proposal to the National Priorities List (NPL). This investigation included reviewing information collected during the site visits, sampling environmental media for determination of the presence and extent of hazardous substances on-site and the migration of these substances from the site, evaluating and documenting HRS factors, and collecting additional non-sampling information. The ESI followed the procedures set forth in the *EPA Guidance for Performing Site Inspections Under CERCLA*, Interim Final, EPA 540-R-92-021 and will be used in support of a decision by EPA Region 6 as to whether the site warrants further investigation under CERCLA (Reference 2).

The project followed the procedures set forth in the Quality Assurance Project Plan (QAPP) (Reference 3) and the approved DEQ Quality Management Plan (QMP) for State fiscal year 2011, EPA QTRAK # 11-024 (Reference 4).

2. SITE DESCRIPTION

2.1 Location

The Site consists of the former Wilcox Refinery located in N ½ of the NW 1/4 of S29 T16N R9E and the SW 1/4 of the SW ¼ of S20 T16N R9E in Creek County, Oklahoma. The site's center has the coordinates 96°22'48.693" West longitude 35°50'26.8966" north latitude. The site covers approximately 125 acres (Reference 5; Figure 1).

2.2 Site Description

The site includes remnants of former oil refining operations and tank farms. The site can be divided into three major former operational areas: two processing areas with surrounding refined product storage and a crude oil storage area. An active railroad divides the two former processing areas and product storage areas. Most of the refinery structures and tanks have been removed or are in ruins. The northwestern portion of the site, west of the railroad and north of West 221st Street South/Refinery Road, was used as a refined product storage area but is now rural land no longer used for refinery storage purposes. There are multiple areas of stressed vegetation, barren areas, and visible black tarry waste of a hydrocarbon nature (Reference 5)

The southwestern portion of the site, south of Refinery Road, west of the railroad had a processing area and refined product storage. The First Assembly of God Church, playground, and one residence are located where processing and storage occurred. There are multiple areas of stressed vegetation, barren areas, and visible black tarry waste of a hydrocarbon nature (Reference 5).

East of the railroad was a processing and refined product storage areas. Several refined product storage tanks, Refinery-related debris, dilapidated buildings, and structures remain on site. There is one residence in this portion of the site. An intermittent stream (West Tributary) marks the eastern extent of the processing and refined product storage area east of the railroad. This tributary runs north to south and flows into Sand Creek to the south. There are multiple areas of stressed vegetation, barren areas, and visible black tarry waste of a hydrocarbon nature (Reference 5).

To the east of the West Tributary is a former large crude oil storage area/tank farm. There are four residences located on top of or directly next to former tank locations. There are multiple areas of stressed vegetation, barren areas, and visible black tarry waste of a hydrocarbon nature. Waste was also observed in several drainage channels that empty into Sand Creek (Reference 5).

There are a total of six residences on the site, all of which are located on former tank or refinery operations locations. Three of the residences located on the eastern portion of the site are known to use water from domestic/private wells located on site. The drainage pattern of the site is primarily towards Sand Creek that follows the western and southwestern boundaries of the site. Two intermittent streams and several drainage channels cross the portion of the site east of the railroad, both of which flow into Sand Creek (Reference 5).

There are multiple areas of stressed vegetation, barren areas, and visible black tarry waste of a hydrocarbon nature (Reference 5).

A detailed title search in the Creek County Clerk office confirms that the property was used in oil refinery operations from 1915 until November 1963. Site access is not controlled. There are no fences on the property and there are no schools or day cares located within 200 feet of the site

(Reference 6). During several sampling events, site visits, and based on conversations with property owners, it is believed that there are children living in all six residences on site (Reference 5).

2.3 Previous Investigations and Regulatory History

Multiple investigations have been performed on the site since 1994:

- Preliminary Assessment (PA) was performed at the former Wilcox Refinery Site by the Oklahoma Department of Environmental Quality (ODEQ) in December 1994 (Reference 7).
- Expand Site Inspection (ESI) was performed at the former Wilcox Refinery Site for the Environmental Protection Agency (EPA) in March 1997 (Reference 8).
- Site Assessment (SA) was performed at the former Wilcox Refinery Site by EPA in March 1999 (Reference 9).
- PA was performed at the former Lorraine Refinery Site by ODEQ in September 2008 (Reference 10).
- Site Inspection (SI) was performed at the former Lorraine/Wilcox Refinery Site by ODEQ in August 2009 (Reference 11).
- ESI was performed at the former Lorraine/Wilcox Refinery Site by ODEQ in September 2010 (Reference 12).

Recent investigations (2009-2011) will be discussed briefly in Section 8 of this document.

There is no information of any regulatory measures taking place during refining operations.

2.4 Operational History and Waste Characteristics

The area was once occupied by an oil refinery. The wastes associated with this type of facility include crude oil, tank residues, brine, acid and caustic sludges, heavy metals, petroleum products, coke, sulfur compounds, and solvents. Waste management practices are unknown for this facility (Reference 6).

The Sanborn Insurance Map indicates that the property contained about 65 storage tanks of various sizes, a cooling pond, and around 10 buildings housing refinery operations. The map also indicated that crude oil, fuel oil, gas oil, distillate, kerosene, benzene, and benzene (petroleum ether) were all stored on the property by the Lorraine /Wilcox Refining Company (Reference 14).

There are several areas of stressed vegetation, barren soil, and spots of tarry waste (Reference 5).

3. WASTE/SOURCE SAMPLING

After reviewing a Soil Survey of Creek County (Reference 13), Sanborn maps (Reference 14), previous investigations (References 7, 8, 9, 10, 11, and 12), and Site reconnaissance (Reference 5) samples locations were determined.

3.1 Sample Locations

A total of nine waste samples were collected to identify hazardous substances at the site and investigate whether these substances have been released into the environment, especially a possible migration of the contaminants from the site to the aquifer (Reference 5, 6, 20, and 21).

During the sampling event several deviations from the Sampling and Analysis Plan (SAP) were necessary based on site conditions (References 20 and 21).

Sample collection date/time, locations and justification is depicted in Table 1 and Figures 3 and 4.

3.2 Analytical Results

The collected samples were analyzed for total metals; including Mercury and semi-volatile organic compounds (SVOCs) using Oklahoma State Environmental Laboratory (SEL) methods and procedures (Reference 15 and 16).

During the ESI metals were detected in every waste sample location.

The following waste samples showed elevated levels of metals contaminants when compared to three times background concentrations: Waste samples W-1, 2, 4, 5, 6, 7, and 9 (Reference 16).

The following waste samples showed elevated levels of Semi-Volatile Organic contaminants when compared to three times background concentrations: Waste samples W-3, 4, 7, and 8 (Reference 16).

The analytical data for these samples is shown in Table 6 and Figures 5, 6, and 7.

3.3 Sources

Based on the analytical data presented in Tables 2, 3, 4, 5, 6 and information collected during the sampling event, the location, type, and size of on-site source was determined. The area of contaminated soil was determined by considering samples not only designated specifically as Waste samples. *The area of contaminated soil is considered a waste source for the purposes of this ESI.* Analytical results for other samples included in determining the waste source is discussed in sections 5 and 6.

After triangulating between surface soil sample points SS-2, SS-8, SED-2, W-8, SED-1 and W-1, it was concluded that the contaminated source area is a polygon and covers about 46 acres. Acreage was plotted using Geographic Information System (GIS) mapping software (Reference 19, Figure 7).

Previous investigations and historical documents/maps provide information about location and size of former storage tanks used by the refinery (References 7, 8, 9, 10, 11, 12, and 14).

Widespread waste in locations where refined product and crude oil was stored could potentially be a source of hazardous substances or release to the environment (Figure 2).

3.4 Conclusions

Elevated concentrations of metals and semi-volatile organic compounds collected from samples collected within the site boundary (Surface Soil, Sediment, and Waste sample locations) were detected. The presence of elevated levels of contaminants could be explained by the former refinery activities on the site. The waste is unconfined and could migrate off site via ground water pathway, surface water runoff, or in the air. The presence of elevated metals and organics suggests a potential release of contaminants to off-site surface waters (Reference 16; Figures 5, and 7).

4. GROUND WATER PATHWAY

4.1 Hydrogeology

The Barnsdall Formation is approximately 200 feet thick at the site and consists of massive to thin beds of coarse to fine grain sandstone, irregularly interbedded with sandy to silty shale. Sandstone outcrops of the Barnsdall Formation are common throughout the site, and potentially receive ground water recharge from downward infiltration of direct precipitation at the surface, as well as infiltration from shallow, perched ground water zones. The Barnsdall Formation is a bedrock aquifer but is not considered to be a Principal Ground Water Resource by the Oklahoma State Department of Health (OSDH). However, the site is in close proximity to the Vamoosa-Ada aquifer (References 6 and 8).

The upper part the Barnsdall Formation and Sand Creek alluvial aquifer are unconfined, with shallow water table. The site is in a potential recharge area and thus is susceptible to ground water contamination from petroleum waste or contaminated soils. Depths to seasonal perched water zones area less than 10 feet and the shallowest regional water bearing formation is reportedly less than 25 feet below ground surface (bgs) (References 6 and 8).

4.2 Targets

Of the residences on site, three have private wells that are used for drinking water. There are three residents directly north of the site and two residents south of the site that use ground water from private wells. A total of eight residents on/near the site are considered to be primary targets for the ground water pathway. There are three residences on site that obtain water from

public/municipal wells that are located within 2 miles of the site; these wells are outside the influence of the site (Reference 6 and 17; Figure 2).

The total population served by private wells is described in the table below. The numbers were arrived at by multiplying the number of wells by the estimated average number of persons (2.57) within each household in Creek County, with the exception of the On-site populations which were determined by direct communication with residents (References 5, 6 and

Private/Domestic Wells

Distance from Site (mi)	# of Wells	Est. Population Served by Private Wells
On-site	3	9
0 – ¼	8	24
¼ - ½	0	0
½ - 1	4	10.28
1 – 2	25	64.25
2 – 3	20	51.4
3 – 4	29	74.53
Total	89	244.75

There are five ground water wells, that compromise the City of Bristow public water supply system, located about 1-2 miles west, northwest, and southwest of the site, in the direction opposite and perpendicular to ground water flow. There are no public water wells contributing more than 40% of the total output of the system, which serves an overwhelming majority of the population of the area of interest. The population was calculated by multiplication of the number of households connected to the public water system by the average number of persons per household (References 5, 12, 17, and 22).

It was decided that sampling of the public/municipal ground water wells is not warranted for the purposes of this ESI.

Public Wells

Distance from Site (mi)	# of Wells	Est. Population Served by Public Wells
On-site	0	0
0 – ¼	0	0
¼ - ½	0	0
½ - 1	0	0
1 - 2	5	3869
2 – 3	0	0
3 – 4	0	0
Total	5	3869

4.3 Analytical Results

Ground water samples from private residential wells within the site boundary and adjacent to the site were collected during the Lorraine Refinery ESI in June 2010 (Reference 12). Exceedance for metals: Barium, Chromium, Copper, and Zinc were detected. Every private residential sampled well had an exceedance for at least one constituent (Reference 12).

4.4 Conclusions

During the Lorraine Refinery ESI (2010) investigation/sampling event, primary private target wells within the study area were identified and sampled. Public/municipal wells were determined to be outside the influence of the site and were not sampled. Sample results indicate elevated level of contaminants in all wells sampled (Reference 12).

5. SURFACE WATER PATHWAY

5.1 Hydrology

The drainage pattern for the site is generally to the south. There are five locations where overland flow of surface waters across the site enters perennial waters (Sand Creek). These five locations are likely the most significant probable point of entry (PPE). Sand Creek meanders approximately 2 miles east until it merges with Little Deep Fork Creek, which is the third surface water body within fifteen miles downstream of the PPE (Reference 2; Figure 2).

According to gauging station #07243500 located in the NW ¼ of the SW ¼ of S20 T14N R12E in Okmulgee County, approximately 25 miles southeast from the site, the annual flow rate of the Deep Fork River is 806 cfs. The average annual precipitation in the area is about 37 inches. The 2-year, 24-hour rainfall is about 3.8 inches. The site is not located within the 100-year flood plain (Reference 11).

5.2 Targets

According to the State of Oklahoma, Sand Creek is considered a Habitat Limited Aquatic Community, and a Secondary Body Contact Beneficial Use, as well as having agricultural and aesthetic beneficial uses. Little Deep Fork Creek downstream from Sand Creek is considered a Warm Water Aquatic Community, and a Primary Body Contact Beneficial Use, as well as having agricultural and aesthetic beneficial uses. The Oklahoma Department of Wildlife Conservation lists the Heyburn Wildlife Management Area within the 15-mile target distance. This area and its associated watershed are considered to be sensitive areas (Reference 11).

Several species have been identified within the study area as endangered: American Burying Beetle (*Nicrophorus americanus*), and Interior Least Tern (*Sterna antillarum*). Species identified as threatened or vulnerable are: Woodchuck (*Marmota monax*), Prairie Mole Cricket (*Gryllotalpa major*), and Bachman's Sparrow (*Aimophila aestivalis*). There is no drinking water intakes associated with the surface water pathway (Reference 11).

5.3 Sample Locations

After reviewing a Soil Survey of Creek County, Sanborn maps, site reconnaissance, and previous investigations, sediment sample locations were determined (References 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14; Figure 3).

During the sampling event several deviations from the Sampling and Analysis Plan (SAP) were necessary based on site conditions. Several PPE locations in Sand Creek were not sampled due to access issues (Reference 21).

5.4 Analytical Results

The collected samples were analyzed for total metals; including Mercury and semi-volatile organic compounds (SVOCs) using Oklahoma State Environmental Laboratory (SEL) methods and procedures (Reference 15 and 16).

During the ESI metals were detected in every Sediment sample location. The following Sediment samples showed elevated levels of Metals contaminants when compared to background concentrations (3 x background concentrations): Sediment samples SED- 2, 3, 5, and 11 (Reference 16). The analytical data for these sample exceedances is shown in Table 3.

No SVOC's were detected in Sediment Samples (Reference 16; Figure 6).

5.5 Conclusions

Elevated concentrations of metals from sediment samples collected within the site boundary were detected. The presence of elevated levels of contaminants could be explained by the former refinery activities on the site. The contaminated soil is unconfined and could migrate off site via surface water runoff, or in the air. The presence of elevated metals suggests a potential release of contaminants to off-site surface waters (Figures 2, 3, and 5).

6. SOIL EXPOSURE PATHWAY

6.1 Physical Conditions

The Site consists of the former Wilcox Refinery located in N ½ of the NW 1/4 of S29 T16N R9E and the SW 1/4 of the SW ¼ of S20 T16N R9E in Creek County, Oklahoma. The site's center has the coordinates 96°22'48.693" West longitude 35°50'26.8966" north latitude. The site covers approximately 125 acres (Reference 6).

6.2 Targets

There are six residences and a church located within the site boundary. Sampling for this ESI focused on the middle portion of the site, west of the west tributary, that was the former Wilcox processing, and Refined product storage areas. There are two residents located within this study area (Reference 5; Figure 2).

6.3 Sample Locations

Seven surface soil Samples were collected from within the site boundary and one collected adjacent to the site to the north. A background sample was collected outside the influence of the site. Samples were collected from one residential yard, from locations down gradient, west of the west tributary, and north of Sand Creek (Reference 6 and 21; Figures 2, 3, and 4).

Soil samples were taken in order to determine whether the soil is contaminated and if so, to what extent (References 2).

Surface soil samples locations and justification are described in Table 1 and depicted in Figure 3.

During the sampling event several deviations from the Sampling and Analysis Plan (SAP) were necessary based on site conditions (Reference 21).

6.4 Analytical Results

The collected samples were analyzed for total metals; including Mercury and semi-volatile organic compounds (SVOCs) using Oklahoma State Environmental Laboratory (SEL) methods and procedures (Reference 15 and 16).

During the ESI metals were detected in every surface soil sample location. The following Surface Soil samples showed elevated levels of metals when compared to three times background concentrations: Surface Soil Samples SS-1, 2, 3, 4, 5, 6, 7, and 8.

The following surface soil samples showed elevated levels of SVOCs when compared to three times background concentrations: surface soil samples SS-2, 3, 4 and 8 (Reference 16; Figure 6).

The analytical data for these samples is shown in Tables 2 of this document.

6.5 Conclusions

Elevated concentrations of metals and SVOCs from surface soil samples collected within the site boundary were detected. The presence of elevated levels of contaminants could be explained by the former refinery activities on the site. The contaminated soil is unconfined and could migrate off site via surface water runoff, or in the air. The presence of elevated metals and SVOCs suggests a

potential exposure to residents or release of contaminants to off-site surface waters (Figures 2, 5, 6, and 7).

7. AIR PATHWAY

7.1 Site Conditions

It is likely that air emissions occurred during the operational period of the refinery operations; however, the only emissions of concern currently at the site are contaminated soil particles and semi-volatile organic compounds that could become airborne.

7.2 Targets

The residents living on site are considered the nearest individuals. The estimated population and wetland acreage within four miles of the site is described in the following table (Reference 12).

Estimated Population and Wetland Acreage

Distance from site (mi)	Estimated Population	Estimated Wetland Acreage
On-site	19	2
0 - ¼	54	4.5
¼ - ½	495	7
½ - 1	1,836	9
1 – 2	2,691	65
2 – 3	1,017	145
3 – 4	517	112
TOTALS	6134	342.3

7.3 Sample Locations/Analytical Results

Since air sampling is outside the scope of an ESI, no formal air monitoring program was conducted and no air samples were collected.

7.4 Conclusions

A release to the air pathway has not been documented at the site, and no odor was detected during the sampling event.

8. SUMMARY AND CONCLUSIONS

Two refinery process facilities and storage tank areas once operated on the site. Recent investigations (2009-2011) indicate the site area contains elevated concentrations of metals and organic compounds in surface soils and sediment. The total area of soil contamination, based on comparison with background levels, is estimated at 62 acres. Elevated levels of metals were detected in three private residential wells on site, and from three wells adjacent to the site. The contamination can be explained by the former refining operations.

A church and six residents are on site. Evidence suggests numerous children residing in every residence, half of which utilize ground water from private wells.

A large volume of visible waste is present where refined product and crude oil storage tanks once stood. The waste is unconfined and could migrate off site via the ground water pathway, surface water runoff, or in the air. Elevated levels of metals in surface soil samples collected may be considered as an indicator of the migration of the contaminants from the site down gradient towards Sand Creek.

Due to limited access to portions of the site and to Sand Creek a final conclusion as to the extent of contamination and migration of contaminants into Sand Creek and beyond requires an additional investigation.

TABLES AND FIGURES

Table 1: Sample Collection

Sample Number	Sample Type	Location and Justification	Date	Time
LWSS-9	Surface Soils	Background Sample Location , north of site, outside the influence of the site	6-9-2010	15:15
SS-1	Surface Soils	North of site, West of west tributary,	6-28-2011	14:41
SS-2	Surface Soils	Former refined product storage area, Residential yard	6-28-2011	14:11
SS-3	Surface Soils	Former refined product storage area, West of West Tributary, Waste observed	6-28-2011	13:41
SS-4	Surface Soils	Former refined product storage area, West of West Tributary, Waste observed	6-28-2011	13:32
SS-5	Surface Soils	Former refined product storage area, West of West Tributary, Large non-vegetated area, Waste observed	6-28-2011	13:21
SS-6	Surface Soils	Former refined product storage area, West of West Tributary and pond, Large non-vegetated area, Waste observed	6-28-2011	13:10
SS-7	Surface Soils	Former refined product storage area, West of West Tributary and pond, Large non-vegetated area, Waste observed	6-28-2011	13:15
SS-8	Surface Soils	Duplicate Sample of SS-7, Former refined product storage area, adjacent to existing tank , Waste observed	6-28-2011	12:52
SED-1	Sediment	East Tributary, South site boundary, Downstream of former crude oil storage area	6-29-2011	10:20
SED-2	Sediment	Drainage channel to Sand Creek, Down gradient of former crude oil storage area, Waste observed	6-29-2011	10:55
SED-3	Sediment	Drainage channel to Sand Creek, Down gradient of former crude oil storage area, Waste observed	6-29-2011	11:10
SED-4	Sediment	Drainage channel to Sand Creek, Down gradient of former crude oil storage area, Waste observed	6-29-2011	13:35
SED-5	Sediment	Duplicate Sample of SED-4, Drainage channel to Sand Creek, Down gradient of former crude oil storage area, Waste	6-29-2011	13:35

		observed		
SED-7	Sediment	Sand Creek, Upstream of Site	6-29-2011	14:40
SED-8	Sediment	West Tributary, Down gradient of former refined product storage area	6-28-2011	13:51
SED-9	Sediment	West Tributary, North of site	6-28-2011	14:38
SED-10	Sediment	East Tributary, Upstream of site	6-29-2011	14:15
SED-11	Sediment	Pond, Southern site boundary, Down gradient of former crude oil storage area	6-28-2011	10:56
W-1	Waste	Former crude oil storage area, Waste observed	6-28-2010	11:23
W-2	Waste	Former crude oil storage area, Waste observed	6-28-2011	11:30
W-3	Waste	Former crude oil storage area, Waste observed	6-28-2011	11:12
W-4	Waste	Former crude oil storage area, Waste observed.	6-28-2011	11:40
W-5	Waste	Former crude oil storage area, Waste observed	6-28-2011	10:35
W-6	Waste	Duplicate Sample of W-5, Former crude oil storage area, Waste observed	6-28-2011	10:37
W-7	Waste	Former crude oil storage area, Waste observed	6-29-2011	13:25
W-8	Waste	Former crude oil storage area, Waste observed	6-28-2011	10:15
W-9	Waste	Former refined product storage area, Waste observed	6-28-2011	14:00

26 Site Characterization Sample Locations

2 Background/Upstream Samples

3 QA/QC Samples

TABLE 2: ANALYTICAL RESULTS FOR CONTAMINATED SURFACE SOIL SAMPLES (mg/kg)* COLLECTED DURING THE ESI SS-#. BACKGROUND SAMPLE: LWSS-9.							
Sample ID	LWSS-9	#2	# 3	#4	#5	#6 (7)	#8
<i>Substance</i>							
Barium	118	-	-	-	-	-	-
Chromium	15	-	-	-	-	-	-
Copper	< 5	10	12.7	11.7	68.3	84 (61)	11
Lead	29.7	147	459	366	43600	50000 (43200)	-
Nickel	< 10	-	-	-	-	191	-
Zinc	141	-	-	-	-	-	-
Mercury	< .25	1.73	-	-	-	-	-

TABLE 3: ANALYTICAL RESULTS FOR CONTAMINATED SEDIMENT SAMPLES (mg/kg)* COLLECTED DURING THE ESI SED-#. BACKGROUND SAMPLE: LWSS-9.						
Sample ID	LWSS-9	#2	# 3	#4 (5)	#11	
<i>Substance</i>						
Barium	118	-	-	-	-	
Chromium	15	-	-	-	-	
Copper	< 5	9.90	12.3	(5.70)	8.70	
Lead	29.7	-	-	-	-	
Nickel	< 10	18.4	17.9	(12.8)	-	
Zinc	141	-	-	-	-	
Mercury	< .25	-	-	-	-	

TABLE 4: ANALYTICAL RESULTS FOR WASTE SAMPLES (mg/kg)* COLLECTED DURING THE ESI.

W-#.

BACKGROUND SAMPLE: LWSS-9

Sample ID	LWSS-9	# 1	# 2	#4	# 5 (6)	# 7	# 9	
<i>Substance</i>								
Barium	118	-	-	-	-	-	-	
Chromium	15	-	-	-	-	-	-	
Copper	< 5	-	5.60	7.40	7.90 (6.70)	6.10	78.2	
Lead	29.7	122	2320	254	590 (486)	-	1560	
Nickel	< 10	-	153	-	7.20	-	-	
Zinc	141	-	-	-	-	-	-	
Mercury	< .25	-	-	-	-	-	-	

**TABLE 5: ANALYTICAL RESULTS FOR CONTAMINATED SURFACE SOIL
SAMPLES (ug/kg)* COLLECTED DURING THE ESI
SS-#.
BACKGROUND SAMPLE: LWSS-9.**

Sample ID	LWSS-9	#2	# 3	#4	#8	
<i>Substance</i>						
Benzo (b) fluoranthene	< 440	520	-	1100		
Fluoranthene	< 440	-	-	-		
Benzo (a) pyrene	< 440	610	-	1200		
Benzo (k) pyrene	< 440	-	-	-		
Chrysene	< 440	1400	1900	2800		
Indeno (123cd) pyrene	< 440	-	-	-		
Phenanthrene	< 440	1800	2900	2700		
Pyrene	< 440	1200	2000	2800		
Benzo (ghi) perylene	< 440	550	1000	3200		
Benzo (a) anthracene	< 440	910	1100	1500		
Bis (2-ethylhexyl) phtalate	< 440	-	-	-		

**TABLE 6: ANALYTICAL RESULTS FOR CONTAMINATED WASTE SAMPLES
(ug/kg)* COLLECTED DURING THE ESI
W-#.
BACKGROUND SAMPLE: LWSS-9.**

Sample ID	LWSS-9	#3	# 4	#7	#8	
<i>Substance</i>						
Benzo (b) fluoranthene	< 440	-	-	1200	1100	
Fluoranthene	< 440	-	-	1500		
Benzo (a) pyrene	< 440	-	-	-	1200	
Benzo (k) pyrene	< 440	-	-	-		
Chrysene	< 440	-	-	-	2500	
Indeno (123cd) pyrene	< 440	-	-	-	12000	
Phenanthrene	< 440		-	-	2400	
Pyrene	< 440	490	3300	1200	2600	
Benzo (ghi) perylene	< 440	-	-	-	3000	
Benzo (a) anthracene	< 440	-	1800	-	1300	
Bis (2-ethylhexyl) phtalate	< 440	-	-	-	1400	

* The above information represents samples which showed elevated levels of contaminants (i. e. 3 x backgrounds). The laboratory analyses for all sample points are provided in Reference 16. The detection limits for SEL are provided in its Quality Assurance Plan (Reference 15).

Figure 1: Topographic Features, Wilcox Refinery ESI, Bristow, Oklahoma

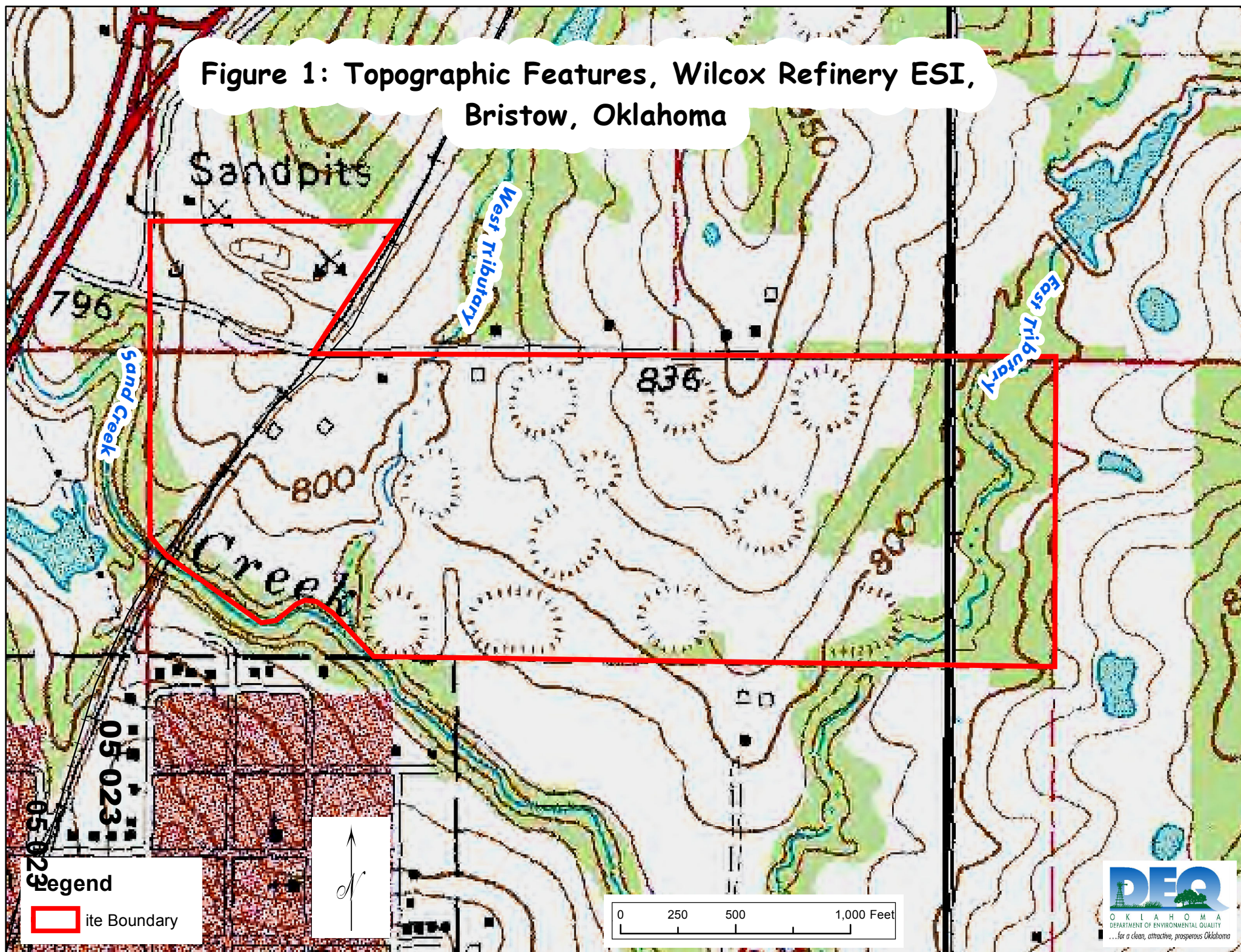


Figure 2: Features of Importance, Wilcox Refinery ESI,
Bristow, Oklahoma

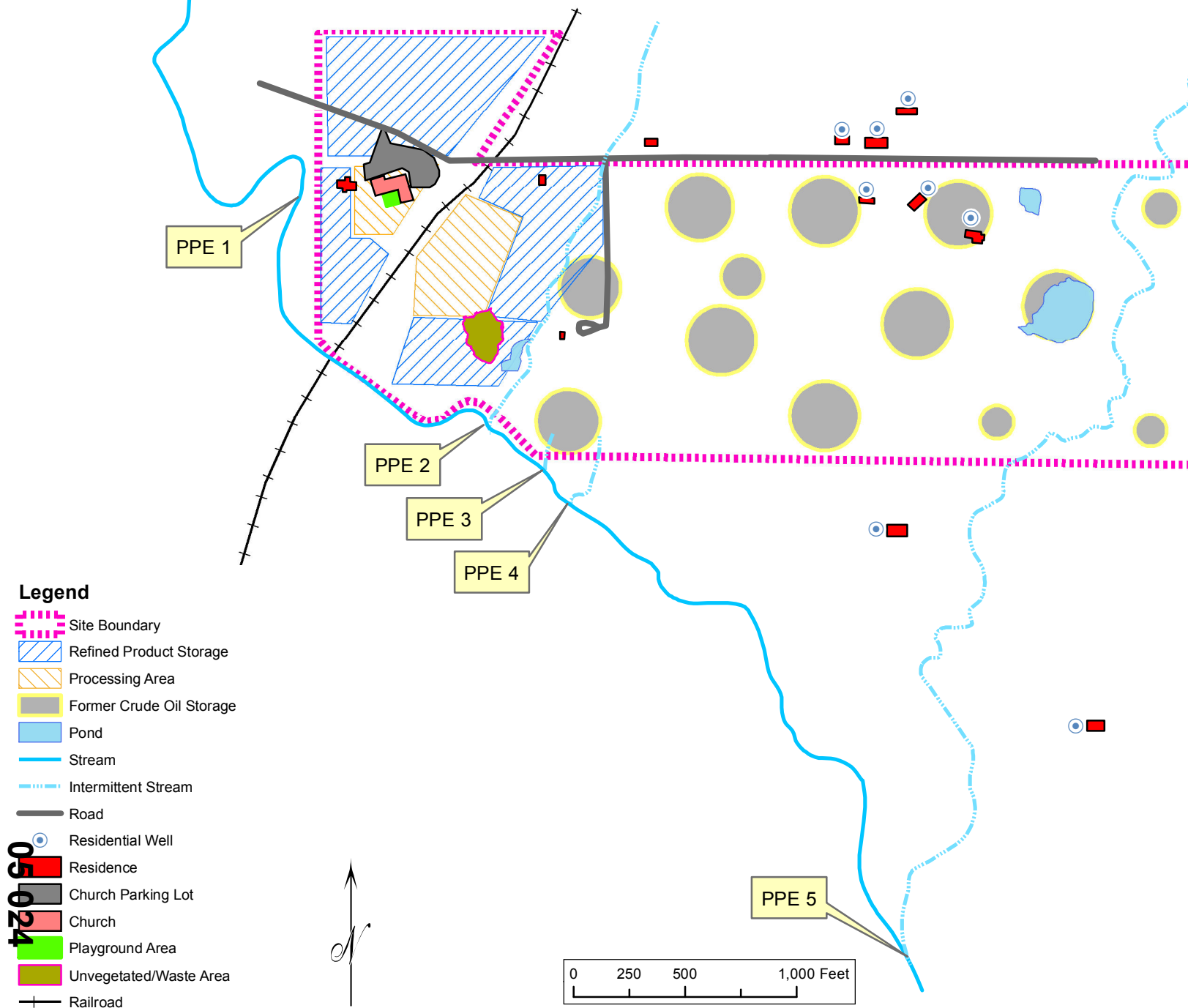


Figure 3: Sample Locations, Wilcox Refinery ESI,
Bristow, Oklahoma

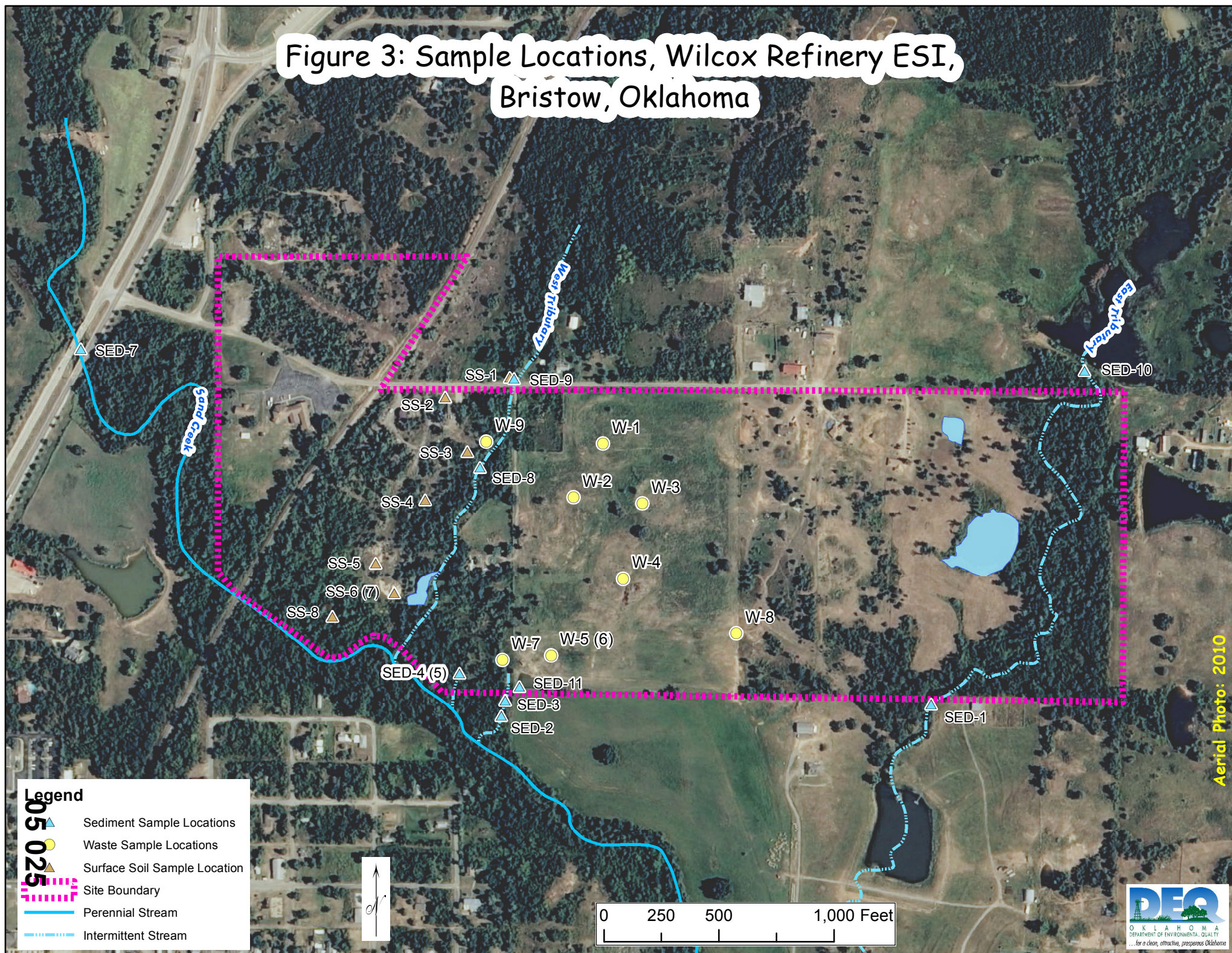


Figure 4: Background Surface Soil Sample Location, Wilcox Refinery ESI, Bristow, Oklahoma

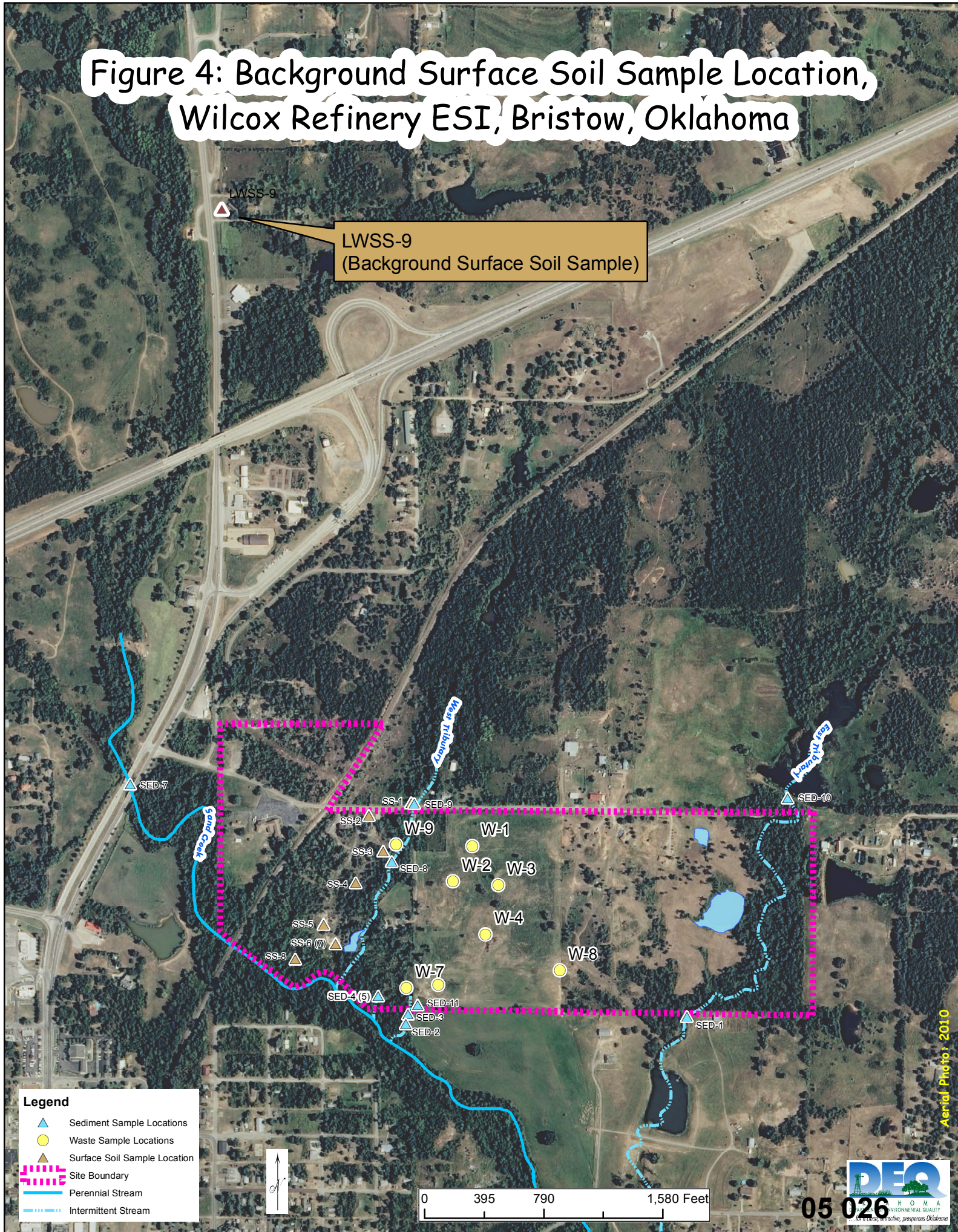
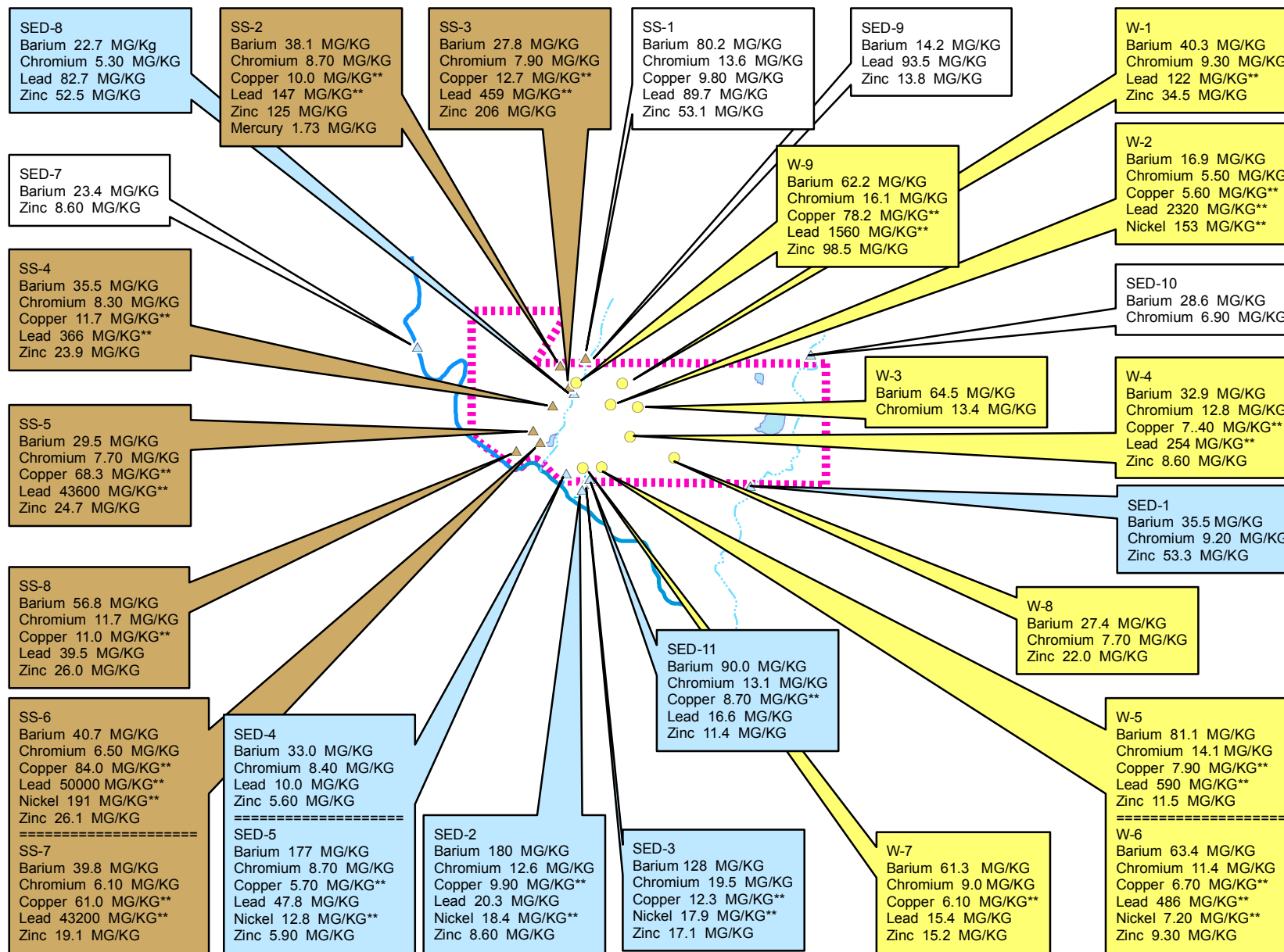


Figure 5: Metals Sample Results,
Wilcox Refinery ESI, Bristow, Oklahoma



** Greater than 3 x background

Surface Soil Sample Sediment Sample Waste Sample Offsite Sample

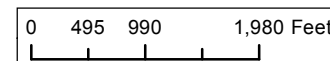
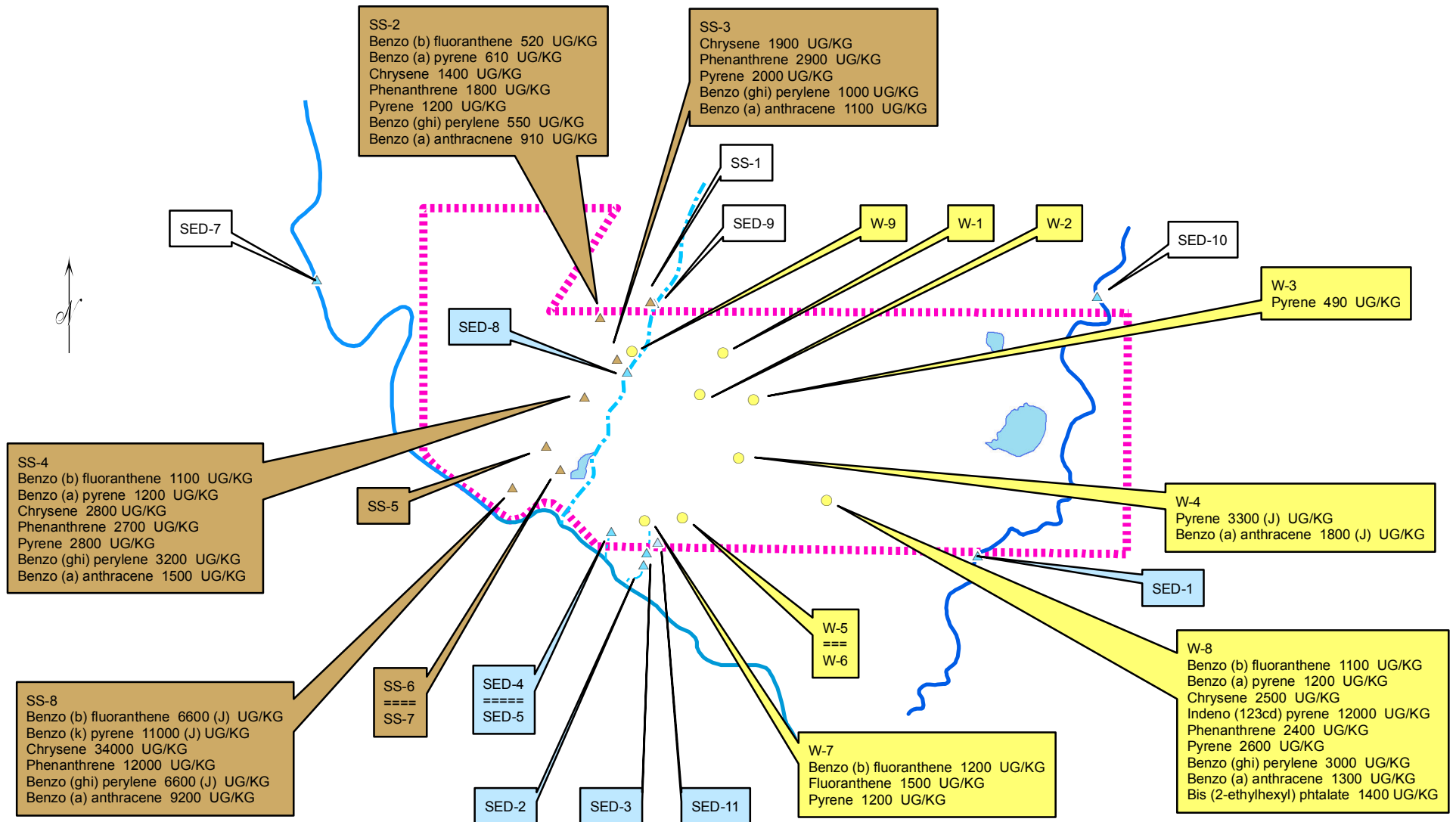


Figure 6: Semi-Volatile Organic Compounds Sample Results,
Wilcox Refinery ESI, Bristow, Oklahoma



05 028

(All results are 3 x greater than background)

Surface Sample **Sediment Sample** **Waste Sample** **Offsite Sample**

0 250 500 1,000 Feet

Figure 7: Area of Contamination, Wilcox Refinery ESI,
Bristow, Oklahoma

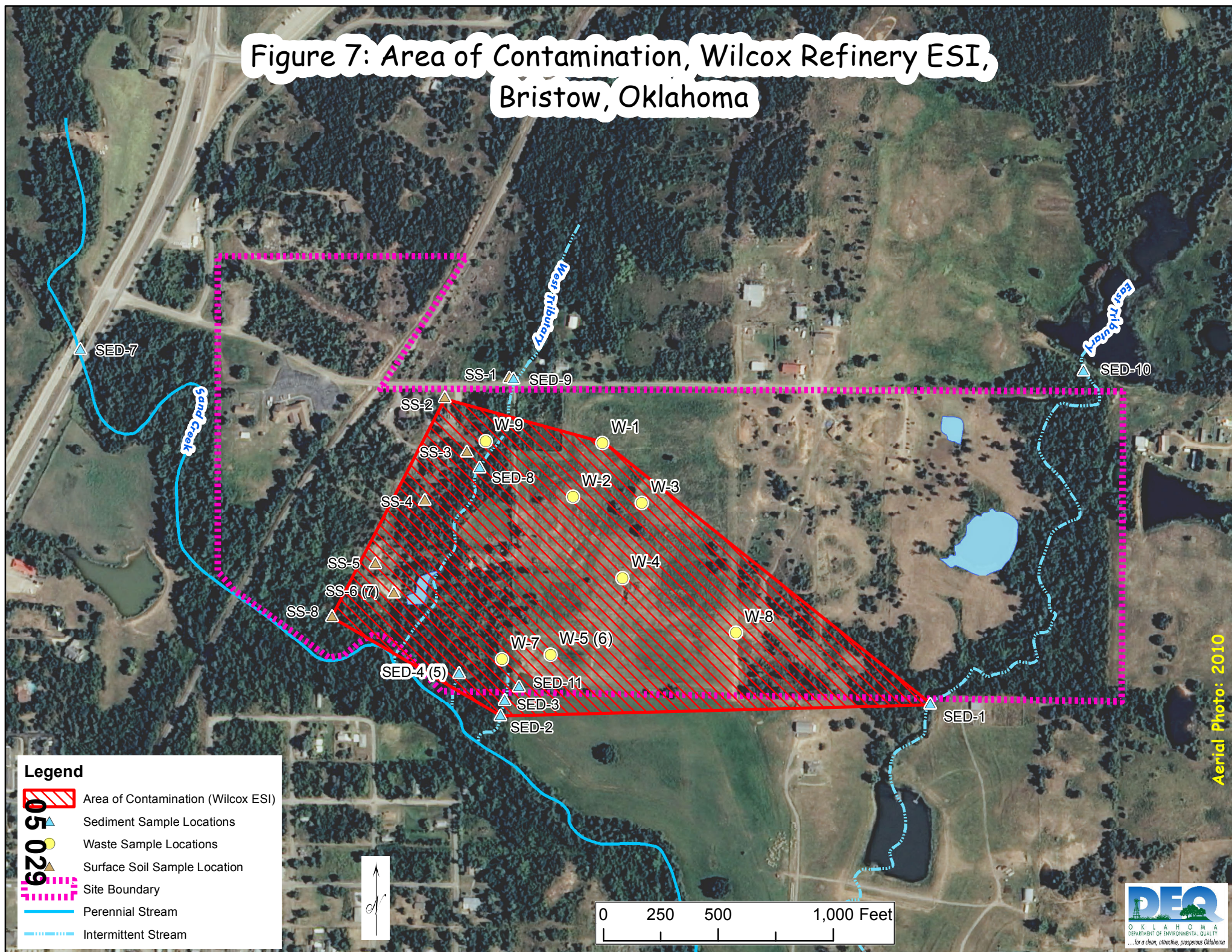


Photo Documentation

Photo #1



Photographer: Todd Downham Date: 6/28/2011 Direction: Southwest Comments: Surface Soil SS-1 location, north of Refinery Road.

Photo #2



Photographer: Todd Downham Date: 6/28/2011 Direction: South Comments: Surface Soil SS-2 location. Residential yard.

Photo #3



Photographer: Todd Downham Date: 6/28/2011 Direction: Southwest Comments: Surface Soil SS-3 location, collected near large horizontal storage tank.

Photo #4



Photographer: Todd Downham Date: 6/28/2011 Direction: West Comments: Surface Soil sample SS-4 location.

Photo #5



Photographer: Todd Downham Date: 6/28/2011 Direction: North Comments: Surface Soil SS-5 location, large impacted area west of west tributary and pond on the Lee property.

Photo #6



Photographer: Todd Downham Date: 6/28/2011 Direction: Northwest Comments: Surface Soil SS-6(7) location, large impacted area west of west tributary and pond on the Lee property.

Photo #7



Photographer: Todd Downham Date: 6/28/2011 Direction: North Comments: Surface Soil SS-8 location, South of existing tank on southern boundary of site.

Photo #8



Photographer: Todd Downham Date: 6/29/2011 Direction: North Comments: Sediment Sample SED-1 location, East tributary near southern site boundary.

Photo #9



Photographer: Todd Downham Date: 6/29/2011 Direction: North Comments: Sediment Sample location SED-2, Drainage channel on southern site boundary that empties into Sand Creek.

Photo #9



Photographer: Todd Downham Date: 6/29/2011 Direction: North Comments: Sediment Sample location SED-3, Drainage channel on southern site boundary that empties into Sand Creek.

Photo #10



Photographer: Todd Downham Date: 6/29/2011 Direction: North Comments: Sediment Sample SED- 4(5) location , Drainage channel on southern site boundary that empties into Sand Creek, large amounts of waste observed.

Photo #11



Photographer: Todd Downham Date: 6/29/2011 Direction: Down Comments: Sediment sample SED-7 location, Sand Creek upstream.

Photo #12



Photographer: Todd Downham Date: 6/28/2011 Direction: South Comments: Sediment sample SED-8 location, west tributary, north of Lee property.

Photo #13



Photographer: Todd Downham Date: 6/28/2011 Direction: East Comments: Sediment sample SED-9 location, west tributary, north of Refinery Road.

Photo #14



Photographer: Todd Downham Date: 6/29/2011 Direction: Down Comments: Sediment sample SED-10 location, East tributary, North of Site boundary.

Photo #15



Photographer: Todd Downham Date: 6/28/2011 Direction: East Comments: Sediment sample SED-11 location, Pond near southern boundary.

Photo #16



Photographer: Todd Downham Date: 6/28/2011 Direction: Northwest Comments: Waste sample W-1 location, former tank location.

Photo #17



Photographer: Todd Downham Date: 6/28/2011 Direction: North Comments: Waste sample W-2 location, former tank location.

Photo #18



Photographer: Todd Downham Date: 6/28/2011 Direction: Northeast Comments: Waste sample W-3 location, former tank location.

Photo #19



Photographer: Todd Downham Date: 6/28/2011 Direction: Southeast Comments: Waste sample W-4 location, former tank location, large area of waste.

Photo #20



Photographer: Todd Downham Date: 6/28/2011 Direction: South Comments: Waste sample W-5(6) location.

Photo #21



Photographer: Todd Downham Date: 6/29/2011 Direction: East Comments: Waste sample W-7 location, former tank location, large amounts of waste.

Photo #22



Photographer: Todd Downham Date: 6/28/2011 Direction: North Comments: Waste sample W-8 location, visible waste.

Photo #23



Photographer: Todd Downham Date: 6/29/2011 Direction: Northwest Comments: Waste sample W-9 location, east of west tributary.

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